IDC-B13,AMD,M

respectively, along a common plane, shown from the side by a line 709, which is parallel to the upper surface of the substrate 10.

~~Page 26, Lines 3-21~~ 13 MW 5-23-06

IDC-B14,AMD

Referring to Fig. 35, if two pitches Λ1,Λ2 exist in the grating 12, two sets of peaks will exist. ~~In particular, for a second grating pitch Λ2, the +/-1st order beams (m=+1 and m=-1), corresponds to output beams 720,722, respectively. For the +/-2nd order beams (m=+2 and m=-2), corresponds to output beams 724,726, respectively. The 0th order (un-defracted) beam (m=0), corresponds to beam 718 and passes straight through the substrate.~~ In particular, for a second grating pitch Λ2, the +/-1st order beams (m=+1 and m=-1) corresponds to output beams 720,722, respectively; the +/-2nd order beams (m=+2 and m=-2) corresponds to output beams 724,726, respectively; and the 0th order (un-diffracted) beam (m=0) corresponds to beam 718 and passes straight through the substrate. The output beams 720-726 corresponding to the second pitch Λ2 project spectral spots or peaks 730-736, respectively, which are at a different location than the point 710-716, but along the same common plane, shown from the side by the line 709.

~~Page 28, Line 19, to Page 29, Line 4~~ IDC-B15,AMD,M

Referring to Fig. 38, instead of using an optical binary (0-1) code, an additional level of multiplexing may be provided by having the optical code use other numerical bases, if intensity levels of each bit are used to indicate code

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IDC-B15,AMD,M

information. This could be achieved by having a corresponding magnitude (or strength) of the refractive index change (δn) for each grating pitch Λ. Four intensity ranges are shown for each bit number or pitch Λ, providing for a Base-4 code (where each bit corresponds to 0,1,2, or 3). The lowest intensity level, corresponding to a 0, would exist when this pitch Λ is not present in the grating 12. The next intensity level 450 would occur when a first low level $\delta n1$ exists in the grating that provides an output signal within the intensity range corresponding to a 1. The next intensity level 452 would occur when a second higher level $\delta n2$ exists in the grating 12 that provides an output signal within the intensity range corresponding to a 2. The next intensity level 454 would ~~level 452, would~~ occur when a third higher level $\delta n3$ exists in the grating 12 that provides an output signal within the intensity range corresponding to a 3. /-

Page ~~30~~ 21, ~~Lines 3-7~~

IDC-B16,AMD,M

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-/Referring to Fig. 30, illustrations (a)-(c), for the grating 12 in a cylindrical substrate 10 having a sample spectral 17 bit code (i.e., 17 different pitches $\Lambda 1$-$\Lambda 17$), the corresponding image on the CCD (Charge Coupled Device) camera 60 is shown for a digital pattern 17 bit locations 89, including Figure 30 illustrations (b), (c) and (d), respectively, of 7 bits turned on (10110010001001001); 9 bits turned on of (11000101010100111); and all 17 bits turned on of (11111111111111111)./-

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IDC-B19,AMD,M

transversely across the substrate 10. In illustration (e), the grating 12 may be located circumferentially around the outside of the substrate 10, and there may be holes 574 inside the substrate 10. In that case, the incident light 24 reflects off the grating 12 to provide the optical light 576.

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Page ~~34, Lines 20-22~~ IDC-B20,AMD

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Referring to Fig. 53, at least a portion of a side of the substrate 10 may be coated with a reflective coating 514 to allow incident light 510 to be reflected back to the same side from which the incident light came, as indicated by reflected light 512.

Page ~~37, Lines~~ 4-14 IDC-B21,AMD,M

Referring to Fig. 54, illustrations (a) and (b), alternatively, the substrate 10 can be electrically and/or magnetically polarized, by a dopant or coating, which may be used to ease handling and/or alignment or orientation of the substrate 10 and/or the grating 12, or used for other purposes. Alternatively, the bead may be coated with conductive material, e.g., metal coating on the inside of a holey ~~holy~~ substrate, or metallic dopant inside the substrate. In these cases, such materials can cause the substrate 10 to align in an electric or magnetic field. Alternatively, the substrate can be doped with an element or compound that fluoresces or glows under appropriate illumination, e.g., a rare earth dopant, such as Erbium, or other rare earth dopant or fluorescent or luminescent molecule. In

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